

Applicant: Markus WIDENMEYER
Docket No. R.305988
Preliminary Amdt.

AMENDMENTS TO THE SPECIFICATION:

Page 1, please add the following new paragraphs before paragraph [0001]:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 USC 371 application of PCT/EP 2004/052748
filed on November 2, 2004.

[0000.6] BACKGROUND OF THE INVENTION

Please replace paragraph [0001] with the following amended paragraph:

[0001] ~~Prior Art~~ **Field of the Invention**

Please replace paragraph [0002] with the following amended paragraph:

[0002] The invention relates to an **improved** exhaust gas system for an internal combustion engine[[,] **of the type** having a depth filter for removing soot from the exhaust gas[[:]] **with** at least the depth filter ~~includes~~ **including** a catalyst material which promotes the oxidation of soot.

Please add the following new paragraph after paragraph [0002]:

[0002.5] Description of the Prior Art

Please replace paragraph [0003] with the following amended paragraph:

[0003] An exhaust gas system of the type ~~defined above~~ **with which this invention is concerned** is known from German Patent Disclosure DE 101 30 338 A1[[:. In it,]] **which discloses** an exhaust gas system for a diesel engine [[is described]]. With [[the]] **this** exhaust gas system, the intent is also to be able to filter soot particles out of the exhaust gas.

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Please replace paragraph [0004] with the following amended paragraph:

[0004] One possible way of ~~doing this is~~ **filtering soot particles is the use of** surface filters, which are also realized as wall flow filters with a honeycomb structure, whose flow conduits are closed in alternation, so that the exhaust gas has to flow through the porous filter walls. To counteract clogging of the filter as the soot load increases, however, such a filter must be continuously or cyclically freed of the accumulating or already-accumulated soot. This can be done by means of thermal combustion and/or catalytic methods.

Page 2, please replace paragraph [0006] with the following amended paragraph:

[0006] From DE 101 30 338 A1, a depth filter is also known[. It] **which** has an open-pore system[.,] ~~which is~~ designed such that even relatively large soot particles can be precipitated out inside the filter body. The filtering action of this depth filter therefore extends over its entire volume or its entire surface area. Once again, clogging of the depth filter is counteracted by providing it with a catalyst, which is intended to enable the oxidation of soot in the depth filter even at relatively low temperatures. To that end, catalyst particles are finely distributed over the surface of the depth filter.

Please add the following new paragraph after paragraph [0006]:

[0006.5] OBJECTS AND ADVANTAGES OF THE INVENTION

Please replace paragraph [0008] with the following amended paragraph:

[0008] This object is attained ~~in an exhaust gas system of the type defined at the outset in~~ that an internal pore structure of the depth filter is provided with a catalyst material which is liquid at an operating temperature of the depth filter, and in particular beyond a temperature

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of approximately no higher than 400°C, and highly preferably no higher than approximately 350°C.

Page 3, please delete paragraphs [0009] and [0011].

Please replace paragraph [0012] with the following amended paragraph:

[0012] **Advantageous refinements of the invention are disclosed.** First, it is proposed that the catalyst material of the depth filter includes "molten salt" material, in particular $\text{Cs}_2\text{SO}_4\text{V}_2\text{O}_5$ or Cs vanadates or Ag compounds, in particular Ag vanadates. These materials are in liquid form at temperatures beyond approximately 350°C.

Page 5, please replace paragraph [0017] with the following amended paragraph:

[0017] The catalytic converter proposed can in particular operate with a platinum catalyst material. As a result, in operation of the engine, nitrogen dioxide is formed, which burns off the soot at the surface filter at a suitable temperature. This is also possible continuously and makes it possible to keep the surface filter **substantially** completely free of soot, since after all, from the depth filter only comparatively little soot even reaches the surface filter, so that only a comparatively slight quantity of soot has to be burned off there.

Page 6, please replace paragraph [0023] with the following amended paragraph:

[0023] The invention also pertains to a method for operating an internal combustion engine with an exhaust gas system of the type in which a surface filter is located downstream of the depth filter. It is proposed that soot ~~depositing~~ **deposited** in the surface filter is oxidized

continuously. This is possible since only comparatively few soot particles reach the surface filter, and because of the comparatively large volumetric flow that passes through the surface filter. In this way, the surface filter always remains maximally permeable, which is optimal for the efficiency of the exhaust gas system.

Page 7, please replace paragraph [0024] with the following amended paragraph:

[0024] Drawing **BRIEF DESCRIPTION OF THE DRAWINGS**

Please replace paragraph [0025] with the following amended paragraph:

[0025] **The invention will be more fully** ~~An especially preferred exemplary embodiment of the present invention is described~~ **herein** ~~in further detail below, in conjunction with the accompanying drawings, in which shown in the drawings are:~~

Please replace paragraph [0026] with the following amended paragraph:

[0026] Fig. 1 [[,]] **is** a schematic illustration of an exhaust gas system with a depth filter and ~~downstream of it~~ a surface filter **downstream of the depth filter**;

Please replace paragraph [0030] with the following amended paragraph:

[0030] ~~Description of the Exemplary Embodiment~~

DESCRIPTION OF THE PREFERRED EMBODIMENT

Please replace paragraph [0031] with the following amended paragraph:

[0031] In Fig. 1, an exhaust gas system of an internal combustion engine is identified overall by reference numeral 10. The engine itself is shown only schematically and is identified by reference numeral 12. The hot combustion exhaust gases are carried away from the engine 12 via an exhaust pipe 14[[. This]] **which** leads first to a depth filter 16[[,]] ~~which is provided~~

with a catalytic arrangement 18[.] ~~This device will be~~ described in greater detail hereinafter. From the depth filter 16, the exhaust pipe 14 leads onward to the surface filter 20[.] ~~This surface filter is~~ provided with a catalytic arrangement 22 on its inflow side and with a further catalytic arrangement 24 on its outflow side. It will likewise be described in greater detail hereinafter.

Page 8, please replace paragraph [0032] with the following amended paragraph:

[0032] The engine 12 [[is]] **may be** a diesel engine[. Its]] **whose** exhaust gas, especially during certain phases of operation, initially still contains soot particles, which are filtered out of the exhaust gas stream by the two filters 16 and 20. In the depth filter 16, the soot particles are deposited in the interior of the filter. In the depth filter 16, a filtering action thus exists over its total volume or its total surface area. One portion of an inner region of the depth filter 16 is shown in Fig. 2. As shown, the depth filter 16 has pores 26 (**Fig. 3**), which are formed ~~between~~ [[a]] **in the** structure 28 of the depth filter 16. In the present exemplary embodiment, this structure is produced from silicon carbide, so that a so-called open-pore silicon carbide foam filter 16 is formed.

Page 9, please replace paragraph [0036] with the following amended paragraph:

[0036] In principle, the depth filter 16 shown has a filtering efficiency of a maximum of only **about** 90%, however. This means that at least **about** 10% of the soot particles 30 pass through the depth filter 16 and reach the surface filter 20. The surface filter 20 is a wall flow filter[.] ~~It has~~ **having** a honeycomb structure, viewed in the flow direction, which is of

cordierite and is identified by reference numeral 32 in Fig. 4. Some of the honeycombs are open on the side pointing toward the engine 12 and closed on the side facing away from the engine 12 (the exhaust gas stream is represented in Fig. 4 by arrows 33). These honeycombs are identified by reference numeral 34 in Fig. 4. Other honeycombs 36, adjacent to the honeycombs 34, are closed on the side toward the engine 12 and open on the side facing away from the engine 12.

Page 10, please replace paragraph [0037] with the following amended paragraph:

[0037] The filtering action is due to the porosity of the structure 32 of the surface filter 20; that is, the exhaust gas stream passes through the wall faces from the honeycombs 34 into the honeycombs 36, as indicated by the arrow 38 in Fig. 4. The surface filter shown in Fig. 4 has a cell number of from 50 to 300 cpsi, a porosity of approximately 50%, and a pore diameter of from 10 to 30 μm . The porosity of the structure 32 is selected such that the surface filter 20 preferentially filters out small soot particles from the exhaust gas stream. The filtering efficiency of the surface filter 20 is in the range from 95 to 99%. In all, because of the combination of the depth filter 16 and the surface filter 20, thus over [[90]] 99% of the soot particles are filtered out of the exhaust gas.

Page 11, please add the following new paragraph after paragraph [0040]:

[0041] The foregoing relates to preferred exemplary embodiments of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.